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Five-Year Review Report

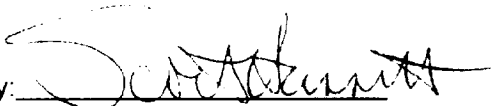
**Second Five-Year Review Report
Of the
Onalaska Municipal Landfill Site
Township of Onalaska
La Crosse County, Wisconsin**

July 2003

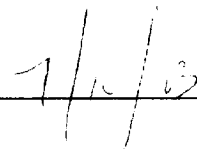
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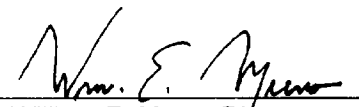
**Wisconsin Department of Natural Resources
West Central Region
La Crosse, Wisconsin**

Approved by: _____


Scott P. Hassett, Secretary
Wisconsin Department of Natural Resources

Date: _____




William E. Muno, Director
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Date: _____

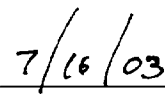


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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CAMU	Corrective Action Management Unit
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CTH	County Trunk Highway
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
ECA	Environmental Contamination Assessment
ESD	Explanation of Significant Difference
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PRP	Potentially Responsible Party
RA	Remedial Action
RAA	Remedial Action Alternatives
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TCE	Trichloroethylene
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources

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Executive Summary

The United States Environmental Protection Agency (U.S. EPA), in consultation with the Wisconsin Department of Natural Resources (WDNR), began a Remedial Investigation and Feasibility Study (RI/FS) at the Onalaska Municipal Sanitary Landfill Site (Site), Onalaska, Wisconsin, in 1988. The RI/FS was completed in 1990, upon issuance of a cleanup decision by the U.S. EPA. The U.S. EPA determined that construction of a landfill cover (cap), a groundwater extraction and treatment system, and a bioremediation system would be protective of human health and the environment.

U.S. EPA, in concert with the WDNR, began construction of the cleanup remedy in 1993. The cleanup remedy was completed in July 1994; operation of the groundwater extraction and treatment and the bioremediation systems commenced at that time. The groundwater extraction and treatment system operated until November 2001, and the bioremediation system was shut down in February 1997. The systems are currently shut down to allow the WDNR to evaluate the effectiveness of natural attenuation in reducing the levels of contamination through natural biological, physical and chemical processes.

To date, the groundwater extraction and treatment system has pumped out 2.2 billion gallons of water for treatment (via air stripping), reducing the levels of contaminants in the groundwater. Current data indicates that two metals (iron and manganese) and two volatile organic chemicals (methylene chloride and trimethylbenzenes) are the only contaminants above the WDNR Enforcement Standards. Methylene chloride and acetone are common laboratory artifacts and their presence in the groundwater samples is attributed to the laboratory. Background levels of iron and manganese in shallow groundwater in Wisconsin are similar to the concentrations detected at the Site. Additional studies will be completed to confirm that exceedences of iron and manganese in shallow groundwater at the Site are attributed to background levels. The bioremediation system, which supplied oxygen (air) to the subsurface soil, effectively reduced the concentrations of the hydrocarbons in the soils. The bioremediation system was discontinued after soil gas data showed that the system no longer contributed to the cleanup. The first Five-Year Review was completed in July 1998 and determined the remedy was protective of human health and the environment. The next (third) 5 Year Review will be completed in July 2008.

The U.S. EPA completed an Explanation of Significant Differences (ESD) on September 29, 2000. This ESD addressed changes to the groundwater cleanup standards, bringing the standards up-to-date with current State cleanup standards.

On November 13, 2001 U.S. EPA completed a second ESD for the Site. This ESD allows for the temporary shut down of the groundwater treatment system to study natural attenuation as an alternative to cleanup the remaining groundwater contamination. The groundwater treatment system was shut down on November 26, 2001. It is anticipated that the system may be shut down indefinitely while U.S. EPA and the WDNR complete the monitored natural attenuation studies. The WDNR took over the operation and maintenance of the Site in June of 2002.

Currently, the Site is being evaluated for natural attenuation as a modification to the remedy (i.e. groundwater extraction). Monitoring for natural attenuation was implemented in the fall of 2001. Preliminary results from natural attenuation monitoring demonstrates that natural attenuation may be an effective modification to the remedy for this Site and would be protective of human health and the environment. Future monitoring and evaluation will be conducted to determine if natural attenuation should be implemented as a modification to the remedy.

Based upon this Five-Year Review, all immediate threats at the Site have been addressed, and the remedy is expected to be protective of human health and the environment after the groundwater goals are achieved through pumping and natural attenuation in an estimated 30 years or less.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Onalaska Municipal Landfill Site		
EPA ID (from WasteLAN): WID980821656		
Region: 5	State: WI	City/County: Onalaska/La Crosse
SITE STATUS		
NPL status: Final		
Remediation status: Operating		
Multiple OUs?* Yes	Construction completion date: <u>6/1/94</u>	
Has site been put into reuse? No		
REVIEW STATUS		
Lead agency: State		
Author name: David L. Carper		
Author title: Remedial Project Manager	Author affiliation: WDNR, West Central Region	
Review period:** <u>4/23/2003 through 7/14/2003</u>		
Date(s) of site inspection: <u>4/22/2003</u>		
Type of review: Five Year Review		
Review number: 2		
Triggering action: Five years after the first Five Year report completed on July 14, 1998		
Triggering action date (from WasteLAN): <u>7/14/1998</u>		
Due date (five years after triggering action date): <u>7/14/2003</u>		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

Through this five-year process several issues were identified. The following is a list of issues identified.

1. Preliminary inspection of the natural attenuation data indicates that natural attenuation may be an effective modification to the ROD.
2. The limited list of chemicals of concern from the ROD did not include the trimethylbenzenes (1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene). Testing for trimethylbenzenes did not begin until 2001 and thus were not evaluated in the risk assessment. The current natural attenuation monitoring program analyzes for 37 VOC including all chemicals of concern. The most recent sampling data indicates that trimethylbenzenes exceed NR 140 criteria in four of the 26 wells sampled.
3. Methylene chloride and acetone have been found in groundwater samples collected at the Site. These two VOCs are common laboratory artifacts and their presence in the groundwater samples is attributed to the laboratory.
4. Concentrations of iron and manganese in groundwater samples collected at the Site have exceeded criteria. Background levels of iron and manganese in shallow groundwater in Wisconsin are similar to the concentrations detected at the Site.
5. The Ackerman domestic residential well is 207 feet deep and is located downgradient of the Site. This well is used for potable uses.

Recommendations and Follow-up Actions:

The following recommendations address the issues identified above.

1. Continue natural attenuation monitoring and evaluation in accordance with plan approvals. Determine if natural attenuation can be an effective modification to the ROD remedy that remains protective to human health and the environment. The WDNR will continue with the natural attenuation monitoring and anticipates incorporating natural attenuation as a modification to the ROD by 2005.
2. Determine if the presence of the trimethylbenzenes requires an additional health analysis. The WDNR will evaluate the need to perform an additional health analyses by July 2004. If additional health analyses are needed this activity will be completed by July 2005.
3. Require that the laboratory instill better practices to reduce the occurrence of methylene chloride and acetone in samples. WDNR has already mandated better laboratory practices and if future laboratory performance does not improve corrective actions will be implemented.

4. Complete additional studies to **evaluate** the occurrence of iron and manganese (as well as other metals) in the **groundwater** with respect to **background** levels and develop Wisconsin Alternative Concentration Limits (WACLs) for iron and manganese, if applicable. Additional studies will be completed by the WDNR and it is anticipated that applicable WACLs will be determined by July 2005.
5. Increase sampling frequency of **twice** per year for Ackerman residential well to better determine changes in **groundwater quality**. Ongoing groundwater sampling will be completed by the WDNR.

Protectiveness Statements:

All immediate threats at the Site **have been** addressed, and the remedy is expected to be protective of human health and the **environment** after the groundwater cleanup goals are achieved through pumping and **natural attenuation** in an estimated 30 years. The cap has been effective in preventing human **contact** with the wastes, and by reducing infiltration at the Site.

Long-Term Protectiveness:

Long-term protectiveness of the **remedial** action will be verified by obtaining additional groundwater samples to fully **evaluate** the effectiveness of **natural attenuation** as a modification to the remedy. Current **data** indicate that **natural attenuation** may be an effective final remedy solution. **Additional** sampling and analysis will be conducted on a regular basis as required in the plan approvals. Routine inspection and maintenance of the cap will ensure long-term effectiveness.

Other Comments:

None.

**Onalaska Municipal Landfill
Onalaska, Wisconsin
Second Five-Year Review Report**

I. Introduction

The purpose of the five-year review is to determine whether the remedy at the site is protective of human health and the environment. The methods, findings, and conclusions of review is documented in this Five-Year Review Report. In addition, Five-Year Review Reports identify issues found during the review, if any, and identify recommendations to address them.

The Department is preparing this Five-Year Review Report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The U.S. EPA interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The Wisconsin Department of Natural Resources (WDNR) conducted the five-year review of the remedy implemented at the Onalaska Municipal Landfill Site (Site) located in Onalaska, Wisconsin. The State Remedial Project Manager (RPM) conducted this review for the entire Site from April 2003 through July 2003. This report documents the results of the review.

This is the second five-year review for the Onalaska Municipal Landfill. The triggering action for this statutory review is the previous Five-Year Review dated July 14, 1998. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. Table 1 lists the chronology for Site milestones.

II. Site Chronology

Table 1 - Chronology of Site Events

Event	Date
The Site was mined as a sand and gravel quarry in the early 1960's. Quarry operations ceased in the mid-1960's and the Town began to use the Site as a municipal landfill.	1960's
In 1978, the Wisconsin Department of Natural Resources (WDNR) determined that the landfill operation did not meet state solid waste codes and ordered the Town to close the landfill by September 1980. After disposal operations ceased, the Town capped the landfill in June 1982.	1978 to 1982
In September 1982, the WDNR sampled four landfill monitor wells and several nearby residential wells for compliance with drinking-water standards, and determined that one residential well, located southwest of the landfill, was found to exceed the Federal drinking-water standard for barium (1.0 mg/L). The well sample also contained five organic compounds at concentrations above background levels. The Town replaced the contaminated residential well with a deep, uncontaminated well in January 1983.	1982 to 1983
Pursuant to CERCLA, U.S. EPA inspected the Onalaska Site in 1983. Subsequent to the submittal of the Site Inspection report in May 1983, the U.S. EPA placed the Site on the National Priorities List (NPL) in September 1984.	1983 to 1984
U.S. EPA, in consultation with the WDNR, completed a Remedial Investigation (RI) at the Onalaska Landfill on December 22, 1989. The RI concluded that the landfill is the source of groundwater contamination, and that original landfill cap had deteriorated and did not meet the landfill closure regulations in effect at the time the landfill closed.	12/22/1989
Based on the findings of the RI, U.S. EPA completed a feasibility study (FS) that evaluated remedial alternatives to address migration of the groundwater contaminant plume. U.S. EPA completed the FS in December 1989.	12/1989
U.S. EPA then issued a Record of Decision (ROD) on August 14, 1990, that called for the: installation of a landfill cap in accordance with federal and state requirements; installation of a groundwater extraction and treatment system to capture and treat contaminants in the groundwater immediately downgradient of the landfill; installation of an air injection system within the area of soils contamination to enhance the bioremediation of organic contaminants; and implementation of a groundwater, surface water, and sediment monitoring program to ensure the adequacy of the cleanup.	8/14/1990
U.S. EPA entered into a Superfund State Contract with WDNR in 1991, which provided that the state would fund 50 percent of the remedial action.	1991
U.S. EPA then began to implement the Remedial Design (RD) and Remedial Action (RA).	1991 to 1992

Table 1- Chronology of Site Events, cont'd.

Event	Date
U.S. EPA completed the landfill cap RD in July 1992 and the groundwater extraction and treatment and the bioremediation systems RD in September 1992.	1992
The landfill cap construction subcontract was awarded on March 25, 1993, and construction commenced on May 1, 1993. A multi-layer clay cap was installed over the landfill. The cap was completed in November 1993. The groundwater and soils construction subcontract was awarded on June 11, 1993, and construction began on July 12, 1993. The groundwater extraction and treatment system was completed in June 1994.	1993 to 1994
A pre-final inspection was conducted by the project managers for U.S. EPA and WDNR on June 1, 1994. At that time, it was determined that the landfill cap, groundwater, and bioremediation systems were constructed as designed and that they were operational.	6/1/1994
The five-year review at the Onalaska Site was completed on July 14, 1998.	7/14/1998
U.S. EPA issued an Explanation of Significant Difference (ESD) for the Onalaska Municipal Landfill on September 29, 2000. The ESD addressed changes to the performance standards addressed in the ROD based on changes to State of Wisconsin drinking Public Health and Public Welfare Groundwater Quality Standards.	9/29/2000
U.S. EPA issued an Explanation of Significant Difference (ESD) for the Onalaska Municipal Landfill on November 13, 2001. The ESD allows for the temporary shutdown of the groundwater extraction and treatment system to evaluate the need for continuous operation of the system and to determine whether natural attenuation processes exist at the Site, which might address the remaining groundwater contamination.	11/13/2001
In June 2002 WDNR assumed the lead in the operation and maintenance of the Site.	June 2002

III. Background

Physical Characteristics

The Onalaska Site is located in the Township of Onalaska, about 10 miles north of La Crosse, Wisconsin. Figure 1, presented in Attachment 1, is a map illustrating the Site location. The 11-acre Site includes the 7-acre former Township landfill and is situated 400 feet east of the Black River, near the confluence of the Mississippi and Black Rivers. The Black River is located within the Upper Mississippi River Wildlife and Fish Refuge, a wetlands area that supports numerous migrating species of birds and is also used for hiking, fishing, hunting, and other recreational purposes by area residents and visitors.

The area surrounding the Site is generally rural, although several residences are located within 500 feet to the north and to the south of the landfill. A subdivision of about 50 homes is located about 1.25 miles southeast of the Site. Agricultural lands are located south of the landfill, and intermittent woods and grasslands border the Site to the east.

Land and Resource Use

The Site was mined as a sand and gravel quarry in the early 1960's. Quarry operations ceased in the mid-1960's and the Town began to use the Site as a municipal landfill, although for a time both municipal and chemical wastes were disposed of in the landfill. In 1978, the WDNR determined that the landfill operation did not meet state solid waste codes and ordered the Town to close the landfill by September 1980. After disposal operations ceased, the Town capped the landfill in June 1982.

History of Contamination

In September 1982, the WDNR sampled four landfill monitor wells and several nearby residential wells for compliance with drinking-water standards. The investigation documented that the sand and gravel aquifer beneath the landfill serves as the primary source of drinking water for area residents and that groundwater contamination had occurred within and around the site. One residential well, located southwest of the landfill, was found to exceed the Federal drinking-water standard for barium (1.0 mg/L). The residential well sample also contained five organic compounds at concentrations above background levels. A landfill monitor-well sample was found to be contaminated with toluene at a concentration of 14.7 mg/L, which is above the State groundwater-quality Enforcement Standard (1.0 mg/L) and the federal drinking water (1.0 mg/L) standard. The Town replaced the contaminated residential well with a deep, uncontaminated well in January 1983.

Initial Response

Pursuant to CERCLA, U.S. EPA inspected the Onalaska Site in 1983. Subsequent to the submittal of the Site Inspection report in May 1983, the U.S. EPA placed the Site on the National Priorities List (NPL) in September 1984.

Basis for Taking Action

U.S. EPA, in consultation with the WDNR, conducted a Remedial Investigation and Feasibility Study (RI/FS) at the Site from April 1988 through December 1989. The major findings of the RI included:

- The landfill is the source of groundwater contamination. Soils located above the water table and adjacent to the southwestern edge of the landfill were contaminated with naphtha solvents derived from the landfill. The contaminated soil zone occurred from 11 feet to 15 feet below ground surface and up to 150 feet from the landfill. Soil samples indicated that contaminant levels of up to 550 mg/kg were present and were a continual source of groundwater contamination.
- The plume consisting of organic and inorganic compounds had migrated at least 800 feet from the southwestern edge of the landfill. The leading edge of the contaminant plume appeared to be discharging into nearby wetlands and the adjacent Black River.
- The upper groundwater aquifer consists primarily of sand and is approximately 135 feet thick. Local residences utilized this aquifer as a primary source of drinking water.
- The predominant organic compounds of concern included toluene, xylene, 1, 1 - dichloroethane (1, 1 -DCA), and trichloroethene (TCE), based upon concentrations and potential impacts to human health and the environment.
- The original landfill cap at the Site had deteriorated and did not meet the landfill closure regulations in effect at the time the landfill closed. The cap was originally to be composed of 2 feet of compacted clay, but the RI showed that the cap is composed of sandy soils in certain portions and that it is only 1-foot thick in other portions.
- Magnetometer anomalies, as well as Site records, suggested that up to 1000 55-gallon drums were likely to have been disposed of in the landfill. Although several crushed and empty drums were found in the landfill during excavation of test pits, the RI could not ascertain whether the drums are concentrated in any one area, although it may be likely that many of the drums would be in the same condition as the drums that were found in the test pits.
- The average depth to the water table and the depth of waste disposal was 15 feet. Thus, the refuse was periodically in direct contact with groundwater. Soil below the water table did not appear to be greatly affected by landfill contaminants, in that the hazardous substances found in the groundwater are soluble. Soluble contaminants would tend to remain dissolved in the groundwater rather than sorbing onto sand particles.

Potential long-term exposure to low levels of VOCs through the use of private wells in contaminated groundwater and plausible adverse discharges of contaminants to the wetlands and Black River downgradient of the landfill were identified as the principal threats to human health and the environment.

IV. Remedial Actions

Remedy Selection

Based on the findings of the RI, U.S. EPA completed a feasibility study (FS) that evaluated remedial alternatives to address migration of the groundwater contaminant plume. U.S. EPA completed the FS in December 1989. U.S. EPA then issued a Record of Decision (ROD) in August 1990 that called for the following actions to mitigate the areas of concern:

- Installation of a landfill cap in accordance with federal and state requirements;
- Installation of a groundwater extraction and treatment system to capture and treat contaminants in the groundwater immediately downgradient of the landfill;
- Installation of an air injection system within the area of soils contamination to enhance the bioremediation of organic contaminants; and
- Implementation of a groundwater, surface water, and sediment monitoring program to ensure the adequacy of the cleanup.

The selected remedy established a containment and treatment system to eliminate the principal threat posed to human health and the environment by isolating the source of groundwater contaminants in the landfill and eliminating those in the adjacent soils, preventing the further migration of VOCs in groundwater, and by treating extracted groundwater to acceptable discharge limits.

The selected remedy established cleanup standards for groundwater based on Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and Wisconsin Administrative Rule Chapter NR 140 Enforcement Standards (ES) and Preventive Action Limits (PAL) for groundwater protection. The selected remedy established an estimated cleanup goal of 80 to 95 percent biodegradation of the organic compounds in the soils adjacent to the landfill.

Remedial Implementation

U.S. EPA entered into a Superfund State Contract with WDNR in 1991, which provided that the state would fund 50 percent of the remedial action. U.S. EPA then began to implement the Remedial Design (RD) and Remedial Action (RA).

The construction of the landfill cap, groundwater extraction and treatment facility, and the bioremediation system was completed in June 1994 and operation and maintenance is ongoing. The U.S. EPA recommended that the groundwater treatment facility continue to be operated as

designed until final groundwater cleanup levels are achieved. The Town of Onalaska is responsible to monitor the landfill cap and landfill gas levels in accordance with State requirements and recommendations.

Completed Activities

- U.S. EPA completed the landfill cap RD in July 1992 and the groundwater extraction and treatment and the bioremediation systems RD in September 1992.
- A Wisconsin Pollution Discharge Elimination System (WPDES) "permit" was issued by the WDNR for the discharge of treated groundwater to the Black River. WDNR determined that air stripping and iron precipitation were acceptable Best Available Technology (BAT) for treatment.
- A 3-month treatability study was conducted in the laboratory to determine the ability of the organic contaminants to degrade and to attempt to determine plausible cleanup goals, optimal air injection conditions, and losses of VOCs due to air stripping or volatilization. Testing showed that approximately 15% of the hydrocarbons were biodegraded during the 3-month test and that approximately 5-6 years of air injection would be needed to reach the target cleanup goal. As a result, U.S. EPA recommended that a full-scale biotreatment system be installed, for the cost of performing a pilot study in the field would approach that of a full-scale treatment system.
- The landfill cap construction subcontract was awarded on March 25, 1993, and construction commenced on May 1, 1993. A multi-layer clay cap was installed over the landfill. The cap was completed in November 1993.
- The groundwater and soils construction subcontract was awarded on June 11, 1993, and construction began on July 12, 1993. Five groundwater extraction wells were installed downgradient of the landfill and are designed to pump a total of 800 to 1000 gallons per minute. A treatment plant was constructed nearby, where the extracted groundwater is subjected to aeration and pH adjustment (iron precipitation), clarification (iron removal), air stripping (VOC removal), and pH readjustment prior to discharge to the Black River. Temporary activated carbon units were placed in the treatment train prior to discharge as a back-up measure while the treatment plant components underwent a 3-month "shakedown" period. The groundwater extraction and treatment system was completed in June 1994.
- Approximately 29 shallow air-injection wells were installed to bioremediate the organic compounds in the contaminated soils adjacent to the landfill. During start-up, the contractor turned the air injection system on to achieve steady-state conditions, and then off to measure oxygen uptake (respiration) rates in the wells. Results showed that biodegradation was occurring as oxygen levels began to fall rapidly. The air permeability of the soil was measured and found to be as predicted, based on the laboratory study.

Lastly, the system was balanced so that each well was injecting the proper amount of air into the soil. Installation of the biotreatment system was completed in June 1994.

- The project managers conducted a pre-final inspection for U.S. EPA and WDNR on June 1, 1994. At that time, it was determined that the landfill cap, groundwater, and bioremediation systems were constructed as designed and that they were operational. A punch list of minor tasks to be completed was developed and a schedule for completion of those items was given to both the landfill cap and the groundwater subcontractors by U.S. EPA's contractor.
- Region 5 signed the Onalaska preliminary close-out report (PCOR) on July 29, 1994, and within that document scheduled the completion of the first Five-Year Review by May 1998.
- On September 29, 2000, U.S. EPA completed an Explanation of Significant Difference (ESD) revising the Site cleanup standards to reflect the current State of Wisconsin groundwater cleanup standards.
- U.S. EPA issued an ESD for the Onalaska Municipal Landfill on November 13, 2001. The ESD allows for the temporary shutdown of the groundwater extraction and treatment system to evaluate the need for continuous operation of the system and to determine whether natural attenuation processes exist at the site, which might address the remaining groundwater contamination.
- On November 26, 2001, the groundwater treatment system was shut down.
- In June 2002 WDNR assumed responsibility for the operation and maintenance of the Site.

Systems Operations and Maintenance

The construction of the landfill cap, groundwater extraction and treatment facility, and the bioremediation system was completed in June 1994 and operation and maintenance is ongoing. Systems operation and Maintenance includes groundwater extraction, wastewater treatment plant operation and maintenance, sampling and monitoring efforts, other routine maintenance and reporting. The U.S. EPA recommended that the groundwater treatment facility continue to be operated as designed until final groundwater cleanup levels are achieved. Currently the system is on stand-by while natural attenuation is being evaluated as a modification to the ROD.

The Town of Onalaska is responsible for monitoring the landfill cap and landfill gas levels in accordance with State requirements and recommendations. The system began operation in the spring of 1994. Quarterly sampling began in March 1995 and was reduced to semi-annual monitoring in March 1997. The results of the monitoring program are summarized in the Annual Groundwater Quality and Capture Report for each year, which are available at the Site information repositories.

Operation and Maintenance Costs

Operation and Maintenance costs include groundwater extraction, wastewater treatment plant operation and maintenance, sampling and monitoring efforts, monitoring well maintenance, and reporting. Prior to the shut down of the system, annual O&M costs for the years of 1998 through 2001 were approximately \$200,000 per year. Since shut down of the system, O&M costs for 2002 and 2003 are approximately \$60,000 per year. Future yearly costs during the natural attenuation study are expected to average \$60,000 per year.

Quality Assurance/Quality Control

Details of the analytical procedures used to ensure the quality of the work were contained in the approved Quality Assurance Project Plan (QAPP) dated July 1997 and the two Addendums/Revision dated February 19, 2002 and April 1, 2002. The remaining groundwater monitoring activities during the conduct of the Long Term Response Action (LTRA), Operation and Maintenance (O&M) and natural attenuation monitoring phases have been performed in accordance with an approved QAPP and Addendums/Revisions. The laboratories used for the analysis of groundwater quality have been approved by U.S. EPA or have been audited by U.S. EPA to ensure that proper analytical protocols were employed.

V. Progress Since the Last Five-Year Review

The groundwater quality continues to exhibit low levels of contaminants (e.g. VOC). The consistency of the low levels has allowed for evaluation of certain modifications to the ROD. Specifically, the November 2001 ESD allows for the temporary shutdown of the groundwater extraction and treatment system to study the effectiveness of continued operation and to study whether natural attenuation processes exist at the Site, which might address the remaining groundwater contamination. This potential modification will not alter the scope of the remedy selected in the August 1990 ROD.

Prior to the temporary shut down study, the groundwater monitoring program was revised. The revised and current monitoring program will monitor the plume behavior under non-pumping condition and ensure that any potential migration of contamination will be detected. If monitoring results show that the contaminant plume is expanding after the shut down, the groundwater extraction/treatment system will be reactivated before the contaminants move beyond the extraction wells' zones of influence.

The revised monitoring program also includes natural attenuation parameters that will be used to assess the fate of the remaining contaminants. At the conclusion of the study the treatment system may be reactivated. It is possible that the results of the study may indicate that the permanent shut down of the treatment system is appropriate. However, before such a permanent change could be implemented a ROD Amendment and consideration of public comments would be required.

Information obtained during the Long-Term Remedial Action (LTRA) phase of work at the Site provided the basis for temporary shutdown of the groundwater extraction and treatment system. U. S. EPA has determined that these modifications are necessary and appropriate. In particular, the decision to temporarily shut down the system was based upon the results of the long-term groundwater monitoring program in place at the Site.

Currently, groundwater samples are collected from 26 monitoring points comprised of six air-injection wells, five piezometers, 13 monitoring wells, and two residential wells. Figure 2, presented as Attachment 2, shows the current monitoring point locations. As discussed further below, the monitoring program has shown that two organic contaminants, trimethylbenzene and methylene chloride, remain above the ES established by the State of Wisconsin. Two inorganic metals, manganese and iron remain above their respective criteria however, are not considered by the State of Wisconsin to be substances of public health concern, but rather aesthetic (taste or odor) criteria.

As stated above, groundwater extraction, treatment, and monitoring will be required until it has been demonstrated that groundwater clean-up levels have been attained. The ROD estimated that the groundwater extraction and treatment system would need to operate for between 5 and 30 years to achieve required cleanup levels. However, after 5 years of operation, and thereafter in increments of 5 years, groundwater quality will be evaluated to determine if the remedial action objectives have been met. If, after the groundwater extraction and treatment system has been operating for a minimum of 5 years, it becomes apparent that it is not technically or economically feasible to achieve clean-up levels, then a (Wisconsin) alternative concentration limit (WACL) may be established for the target compounds. Except where the background concentration of a compound exceeds an ES, the WACL established may not exceed the ES for that compound. Once the standards are met, whether they are ROD standards or WACLs, the groundwater cleanup program will have been completed.

Between April 1999 and September 2000, no organic contaminants of concern identified in the original ROD were detected in any of the monitoring wells above the current Enforcement Standards. In 1999 a full priority pollutant scan was performed on the Site groundwater samples. Previous rounds of monitoring were limited to the chemicals of concern identified in the ROD. The list of chemicals tested for in a full priority pollutant scan is more inclusive than the limited list of chemicals of concern from the ROD but did not include the trimethylbenzenes (1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene). Testing for trimethylbenzenes did not begin until 2001. The current natural attenuation monitoring program analyzes for 37 VOC including all chemicals of concern. Currently, trimethylbenzenes are the most prominent chemical found in the groundwater.

VI. Five-Year Review Process

Administrative Components

WDNR staff met with representatives of the Town of Onalaska to notify them of the initiation of the Five-Year Review. The Five-Year Review for the Onalaska Landfill was conducted by Dave Carper of the WDNR, Remedial Project Manager (RPM) for the Onalaska Landfill.

The review components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

Community Involvement

Activities to involve the community in the Five-Year Review were initiated with a public notice prepared by the WDNR and sent to the local newspaper that a Five-Year Review was to be conducted at the Onalaska Landfill. The press release date was May 2, 2003. The notice invited members of the public to submit any comments to WDNR by July 1, 2003. The notice was also circulated through the WDNR's public and internal information systems.

There were no responses to the public notice.

On June 13, 2003, Mr. Dave Carper interviewed three people knowledgeable about the Site; a nearby resident, the long term Site Operator at the treatment plant, and the town of Onalaska supervisor. The general consensus of the interviews was that the remedial effort has been a success and the public has been kept well informed of Site conditions. The interview records are presented in Attachment 3.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data collected since 1998. Applicable groundwater cleanup standards, as listed in the ROD and Wisconsin NR 140, were reviewed. Attachment 4 presents a list of major documents reviewed as part of this Five-Year Review.

Data Review

Monitoring

A monitoring program was established for the LTRA , O&M and Natural Attenuation phases of the cleanup. Initially, quarterly groundwater monitoring was performed to ensure that hydraulic capture of the plume was occurring and that chemical levels in the groundwater were decreasing. Analytes include the chemicals of concern listed in the ROD and those parameters required under the WPDES discharge "permit" issued by WDNR. As of this date, the monitoring is performed on a semi-annual basis in accordance with the December 4, 2001, Natural Attenuation Plan. The WDNR, in consultation with the U.S. EPA, will certify completion of groundwater remediation activities once it has been determined that clean-up levels have been attained and maintained for all chemicals of concern listed in the ROD or ESD(s).

Soil gas was sampled periodically to ensure that bioremediation of the organic compounds in the sandy soils was occurring. Based on current data, U.S. EPA, in consultation with WDNR, now certifies that soil remediation activity is complete since it has been demonstrated that the bioremediation system no longer contributes to the cleanup of the contaminated soils.

The landfill cap is inspected periodically by the Town of Onalaska, in accordance with the Consent Decree reached with U.S. EPA. The Town will also perform required maintenance.

Results

As stated above, groundwater extraction, treatment, and monitoring will be required until it has been demonstrated that groundwater clean-up levels have been attained.

Monitoring for Natural Attenuation began in October 2001 (baseline natural attenuation monitoring event). This baseline sampling event was completed immediately after the system was turned off. The system was reactivated (for approximately one month) immediately after the baseline sampling event was completed to use up remaining chemicals used in the treatment process. The following are the findings from the most recent two sampling events completed in December 2002 and April 2003. The results from the December 2002 and April 2003 sampling events are summarized and contained as Attachment 5.

- The most common VOC contaminants detected were the trimethylbenzenes (1,2,4 & 1,3,5), acetone and methylene chloride. For the December 2002 sampling event methylene chloride and acetone were found in most wells sampled and in Quality Assurance/ Quality control samples (two trip blanks). It is inferred that the methylene chloride and acetone are laboratory artifacts. Methylene chloride and trimethylbenzene were the only VOCs that exceeded the WDNR Enforcement Standards (ES). Methylene chloride exceeded the ES in AW-25 and trimethylbenzene exceeded the ES in MW-4S, AW-13 and AW-20.

- Of the 37 VOCs analyzed, only 14 VOCs were detected. The following is a list of detected VOCs.

1,2,4-Trimethylbenzene	Naphthalene	1,1-Dichloroethene
1,3,5-Trimethylbenzene	Toluene	1,1-Dichloroethane
Acetone	Benzene	cis-1,2-Dichloroethene
Methylene chloride	Chlorobenzene	2-butanone
Xylenes (total)	Ethylbenzene	

- Manganese and iron are the only metals that exceeded the ES. The concentrations of manganese and iron detected at the Site are within a general range of background levels of manganese and iron in the shallow groundwater in Wisconsin. Additional studies will be completed to determine if the landfill is a source of manganese and iron or if the iron and manganese are within background levels in the groundwater surrounding the Site.
- Preliminary inspection of the natural attenuation parameters indicates that the subsurface conditions are conducive to natural attenuation.
- Groundwater from the Site is flowing south towards the Black River and adjacent wetlands.
- The Ackerman residential well is located downgradient of the Site. During the most recent sampling event (April 2003) the Ackerman well was tested. No VOCs were detected. Monitoring well MW-15M is located between the Site and Ackerman well. MW-15M was tested in December 2002. The PAL for methylene chloride was exceeded but can be attributed as a laboratory artifact. Two other VOCs were detected but are below the respective PAL.

Table 2 provides a comparison of groundwater quality over time from three wells. Wells MW-5S and MW-4S were selected to evaluate water quality immediately downgradient of the landfill. MW-5S and MW-4S have historically been two of the most impacted wells. MW-6S was selected as a well that is located downgradient of the extraction system. All three of these monitoring wells were installed prior to activation of the groundwater extraction system. Data from three different eras (pre-pumping, pumping and post pumping) are included in Table 2. The VOCs listed in the table were identified during the RI as the predominant organic compounds of concern. The groundwater extraction system operated from June 1994 through November 2001.

Table 2 - Comparison of Concentrations of Certain VOCs in the Groundwater

Well Number	Sample Date	Concentration in ppb				
		benzene	toluene	xlenes	1-1, DCA	TCE
MW-4S	10/31/93	0.93	54.64	317	5.71	0.13
	12/19/96	<0.3	7	371.4	<0.2	<1.0
	10/26/98	<8	<8	86	<8	<8
	11/1/01	<0.16	<0.18	30	<0.16	<0.14
	4/22/03	<11	<11	54	<8.6	<12
MW-5S	10/31/93	0.78	160	469	3.39	0.29
	12/18/96	0.7	490.5	174.9	0.3	<1.0
	10/26/98	<0.4	28	27	<0.4	<0.4
	11/02/01	<0.16	0.48	180	<0.16	0.14
	4/22/03	<2.1	<2.2	13	<1.7	<2.4
MW-6S	10/31/93	0.5	1.78	0.1	7.1	0.14
	10/2/96	<1	<1	<1	0.3	<1
	10/27/98	<0.4	<0.4	<0.4	<0.4	<0.4
	10/31/01	<0.16	<0.18	<0.33	0.33	0.16
	12/12/03	<0.37	<0.39	<0.44	0.55	<0.42

Discharge Monitoring

Periodic analysis of extracted groundwater samples system found that levels of contaminants of concern were decreasing. Table 3 provides a comparison of concentrations of certain VOCs in the influent from two of the five groundwater extraction wells (EW-2 and EW-4).

Table 3 - Comparison of Concentrations of the Influent

Well Number	Sample Date	Concentration in ppb				
		benzene	toluene	xylenes	1-1, DCA	TCE
EW-2	6/29/95	<1	31.8	44	<1	<1
	11/24/97	<0.3	5	41	<0.5	<0.5
	4/29/99	<1	<1	18.1	<1	<1
	5/18/01	<5	<5	24	Not reported	Not reported
EW-4	6/29/95	<1	415	96.9	<1	<1
	11/24/97	<0.3	10	43	<0.5	<0.5
	4/29/99	<1	<1	5.6	<1	<1
	5/18/01	<1.4	<1.4	1.1	Not reported	Not reported

Site Inspection

A Site inspection was conducted on April 22, 2003, by the RPM (See Attachment 6). The purpose of the inspection was to **assess** the protectiveness of the remedy, including the maintenance and operation of the **groundwater** extraction and treatment system, and the condition of the monitoring wells.

No significant issues were identified regarding the landfill cap or the groundwater extraction and treatment system. Minor repair is required on several of the monitoring wells. The monitoring wells will be repaired later this summer.

Public Input

On May 2, 2003, the WDNR prepared a press release that was sent to all of the local newspapers. The release was also posted on the WDNR's Internet Site, which is accessible to the public. The release contained a brief summary of the Site activities, the Five-Year Review process and a solicitation for public comment. The public comment period ended July 1, 2003. No comments concerning the Onalaska Landfill or the Five-Year Review process were received during this period.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents and the results of the Site inspection indicate that the remedy is functioning as intended by the ROD, as modified by the ESD. The capping of contaminated wastes within the landfill has achieved the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in waste materials. The effective implementation of institutional controls has prevented exposure to, or ingestion of, contaminated groundwater.

The groundwater extraction and treatment system operated from June 1994 until November 2001, and the bioventing system was operated from May 1994 to February 1997. The bioventing system was shut down after the remedial goals of the bioventing system had been achieved. The groundwater extraction system is currently shut down to allow the WDNR to evaluate the effectiveness of natural attenuation in reducing the levels of contamination through natural biological and chemical processes. The monitoring network provides sufficient data to assess the progress of natural attenuation within the plume.

No activities were observed that would have violated the institutional controls. The cap and the surrounding area were in good repair, there were no signs of unauthorized access, and no new uses of groundwater were observed. The gate and fence to the site is intact and in good repair.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included the ingestion of contaminated groundwater, ingestion of and/or dermal contact with Site soils, and direct contact with contaminated surface waters or sediments due to recreational use of the Black River and wetlands area. Based on data collected to date, there has been no impact to surface waters or sediments surrounding the Site, and thus there is no exposure risk associated with the recreational use of the Black River or wetlands area. The remaining exposure pathways would consist of ingestion of and/or dermal contact with contaminated groundwater and with Site soils. There are currently institutional controls that prohibit construction in or disturbance of Site soils and construction of wells near the Site. Overall the concentrations of total VOC and other chemicals at the Site have been reduced since the 1992 health assessment, through operation of the treatment systems and through natural attenuation. Thus the resulting toxicity of the chemicals are lower, and the risk associated with Site soils and groundwater has been

minimized. Groundwater monitoring has demonstrated that impacts to the groundwater are not affecting potable wells.

The original toxicity data is still valid but may need to be modified to include the trimethylbenzenes. The trimethylbenzenes were not included as chemicals of concern in the health assessment and have only recently been found as prominent chemicals in the groundwater at the Site. There have been no known changes in the toxicity factors for the contaminants of concern that were used in the original risk assessment. These original assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Changes in Cleanup Levels and To Be Considered

ARARs that still must be met at this time and that have been evaluated include: ch. NR 140, Wisconsin Administrative Code (Enforcement Standards and Preventative Action Levels); the Safe Drinking Water Act (SDWA) (40 CFR 141.11-141.16) from which many of the groundwater cleanup levels were derived - [Maximum Contaminant Levels (MCLs), and MCL Goals (MCLGs)]; and ARARs related to monitoring, landfill capping, and operation of the groundwater extraction system.

U.S. EPA issued an Explanation of Significant Difference (ESD) for the Onalaska Municipal Landfill on September 29, 2000. The ESD addressed changes to the performance standards addressed in the ROD based on changes to State of Wisconsin drinking Public Health and Public Welfare Groundwater Quality Standards. In March 2000, the revised ES of 1 mg/L and PAL of 0.2 mg/L for toluene and revised ES of 10 mg/L and PAL of 1 mg/L for xylenes were adopted in NR 140. No other changes to water quality standards have occurred during this 5-year review period. Attachment 7 presents a table that identifies the groundwater ARARs for the Site and lists the groundwater cleanup standards for the chemicals of concern.

Changes to the cleanup levels for iron and manganese should be considered. Additional studies would be needed to further evaluate the occurrence of iron and manganese (as well as other metals) in the groundwater with respect to background levels and develop Wisconsin Alternative Concentration Limits (WACLs) for iron and manganese, if applicable. Iron and manganese historically exceed WDNR PALs in most monitoring points but the concentrations appear to be attributable to background levels.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no information generated during the 5-year review process or other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the Site inspection, and the interviews, the remedy is functioning as intended by the ROD, as modified by the ESDs. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the health assessment, and there have been no change to the standardized health assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Through this five-year process several issues were identified. The following is a list of issues identified.

1. Preliminary inspection of the natural attenuation data indicates that natural attenuation may be an effective modification to the ROD.
2. The limited list of chemicals of concern from the ROD did not include the trimethylbenzenes (1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene). Testing for trimethylbenzenes did not begin until 2001 and thus were not evaluated in the health assessment. The current natural attenuation monitoring program analyzes for 37 VOC including all chemicals of concern. The most recent sampling data indicates that trimethylbenzenes exceed NR 140 criteria in four of the 26 wells sampled.
3. Methylene chloride and acetone have been found in groundwater samples collected at the Site. These two VOCs are common laboratory artifacts and their presence in the groundwater samples is attributed to the laboratory.
4. Concentrations of iron and manganese in groundwater samples collected at the Site have exceeded criteria. Background levels of iron and manganese in shallow groundwater in Wisconsin are similar to the concentrations detected at the Site.
5. The Ackerman domestic residential well 207 feet deep and is located downgradient of the Site. This well is used for potable uses.

IX. Recommendations and Follow-Up Actions

The following are recommendations for this Site resulting from this Five-Year Review.

1. Continue natural attenuation monitoring and evaluation in accordance with plan

approvals. Determine if natural attenuation can be an effective modification to the ROD remedy that remains protective to human health and the environment. The WDNR will continue with the natural attenuation monitoring and anticipates incorporating natural attenuation as a modification to the ROD by 2005.

2. Determine if the presence of the trimethylbenzenes requires an additional health analysis. The WDNR will evaluate the need to perform an additional health analysis by July 2004. If an additional health analysis is needed, this activity will be completed by July 2005.
3. Require that the laboratory instill better practices to reduce the occurrence of methylene chloride and acetone in samples. WDNR has already mandated better laboratory practices and if future laboratory performance does not improve, corrective actions will be implemented.
4. Complete additional studies to evaluate the occurrence of iron and manganese (as well as other metals) in the groundwater with respect to background levels and develop Wisconsin Alternative Concentration Limits (WACLs) for iron and manganese, if applicable. Additional studies will be completed by the WDNR and it is anticipated that applicable WACLs will be determined by July 2005.
5. Increase sampling frequency of twice per year for Ackerman residential well to better determine changes in groundwater quality. Ongoing groundwater sampling will be completed by the WDNR.

X. Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through operation of the groundwater extraction system (as necessary) and natural attenuation, which is expected to require 30 years or less to achieve. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater. All threats at the Site have been addressed through capping of contaminated waste materials and the implementation of institutional controls.

Potential long-term exposure to low levels of VOCs through the use of private wells in contaminated groundwater is the principal threats to human health and the environment. Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminant plume downgradient from the landfill and towards wells. Additional sampling and analysis in accordance with the monitoring plan will be completed semi-annually until the ARARs (or future WACLs) are met. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

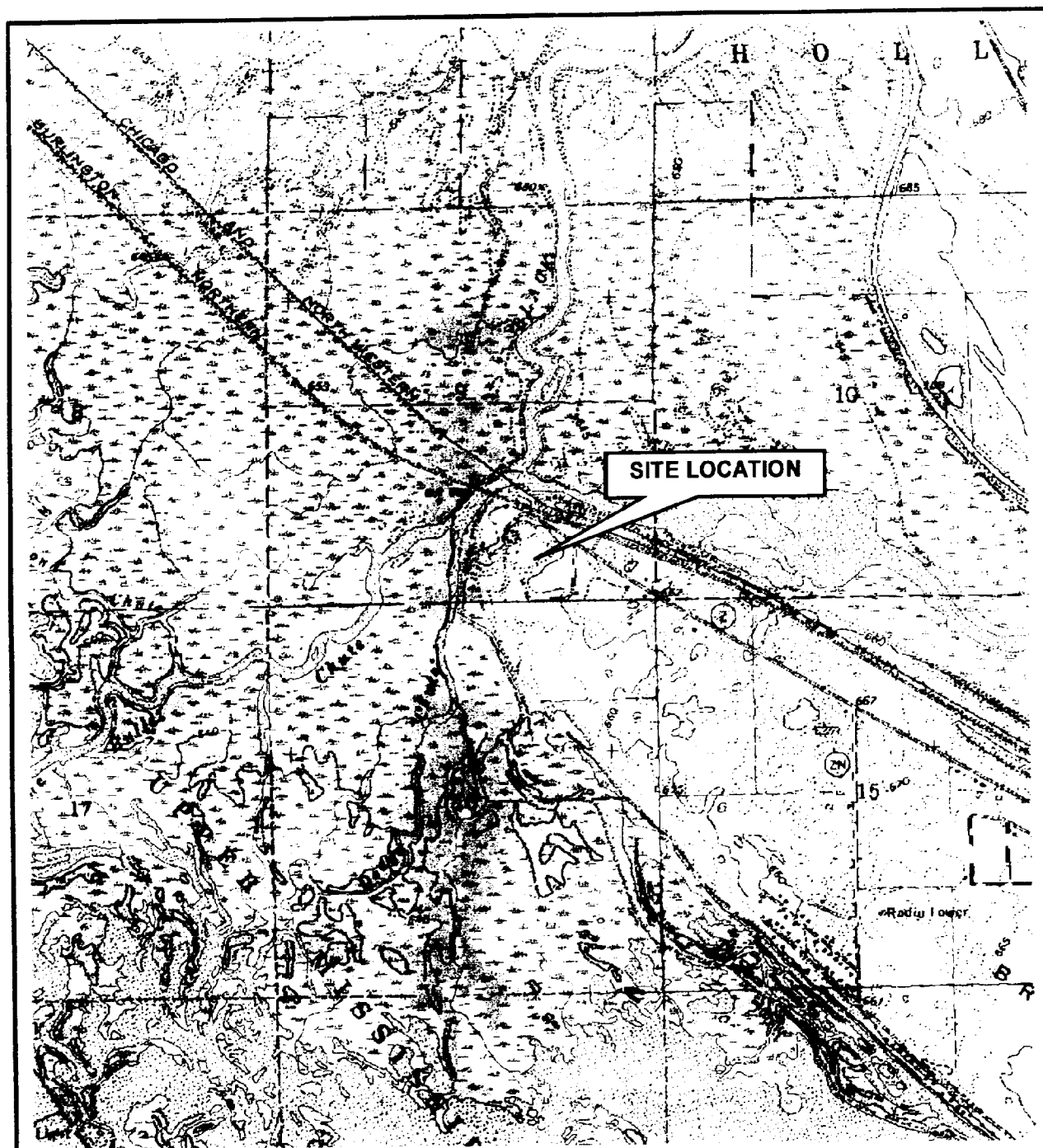
XI. Next Review

The next five-year review for the Onalaska Landfill Site is required by July 14, 2008, five years from the end date of this review.

ATTACHMENTS

Attachment 1

Site Location Map



SOURCE: USGS 7½ Minute Topographic Quadrangle Holmen, Wi-Minn., dated 1973, obtained from DeLorme

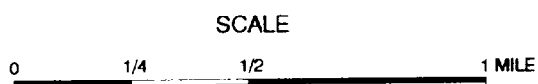


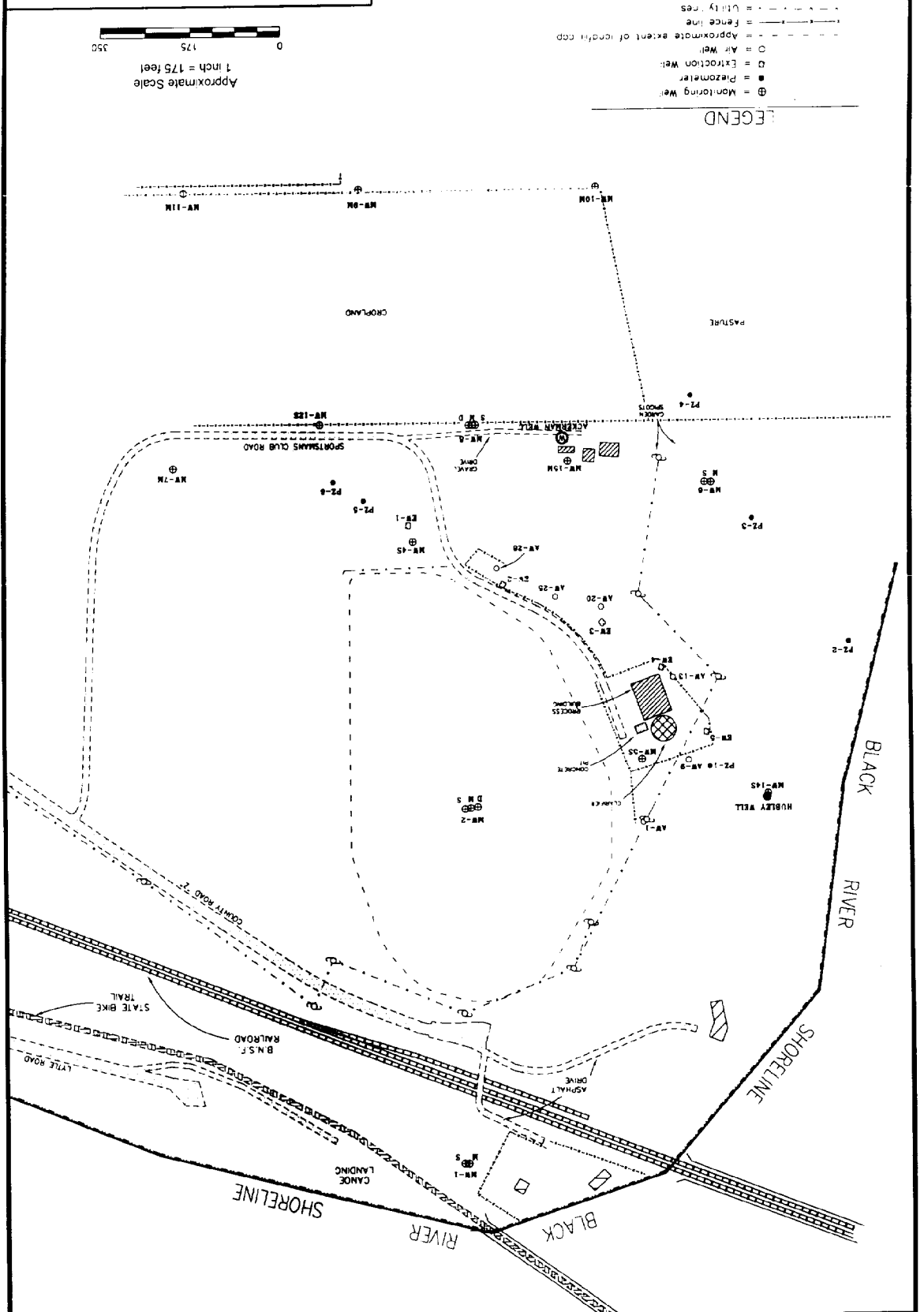
FIGURE 1
SITE LOCATION MAP

Onalaska Landfill
Onalaska, Wisconsin

DRAWN: CMB	DATE: June 2003	PROJECT NO.	REV:
FILE NO: FIG1.DOC	CHECKED: PJM	09413-114	0

Attachment 2

Site Plan



Attachment 3

Interview Records

INTERVIEW RECORD

Site Name: Onalaska Landfill Superfund Site

EPA ID No: ----

Subject: 5 Year Review

Time: 11:00a.m.

Date: 06/13/03

Type: ☒ Telephone ☐ Visit ☐ Other

☐ Incoming ☐ Outgoing

Location of Visit: ----

Contact Made By::

Name: Dave Carper

Title: Project Manager

Organization: WDNR

Individual Contacted:

Name: Bill Wood

Title: Site Operator

Organization: ENSR

Telephone No: 608:788-8571

Street Address: W2788 Birch Lane

Fax No: -- --

City, State, Zip: La Crosse, WI 54601

E-Mail Address: ----

Summary of Conversation

Mr. Wood has been the primary site operator since the remediation system was started. He feels that the remedial system has operated well throughout the remediation. He feels that the remediation has been a success, exceeding expectations. It is his opinion that it was a "good decision" to evaluate the effectiveness of natural attenuation on the remaining contaminants in the groundwater at the site.

INTERVIEW RECORD

Site Name: Onalaska Landfill Superfund Site		EPA ID No:	
Subject: 5 Year Review		Time: 11:00a.m. Date: 06-13-03	
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Location of Visit:			
Contact Made By::			
Name: Dave Carper		Title: Project Manager	Organization: WDNR
Individual Contacted:			
Name: Ray Hubley		Title: Neighbor	Organization:
Telephone No: 608-781-0965		Street Address: W8672 CTH Z	
Fax No:		City, State, Zip: Onalaska, WI 54650	
E-Mail Address:			
Summary of Conversation			
<p>Mr. Hubley observed that the project has "served it's purpose" and the cleanup was effective. He felt that since the inception of the remediation that the degree of contamination did not merit the remedial effort. He feels he has been kept well informed, and would like to see the area developed as a natural area.</p>			

INTERVIEW RECORD

Site Name: Onalaska Landfill Superfund Site		EPA ID No:	
Subject: 5 Year Review		Time: 11:00a.m. Date: 06/13/03	
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Location of Visit:			
Contact Made By::			
Name: Dave Carper		Title: Project Manager	
Organization: WDNR			
Individual Contacted:			
Name: Dave Paudler		Title: Town Supervisor	
Organization: Town of Onalaska			
Telephone No: 608-781-0952		Street Address: W7769 CTH ZB	
Fax No:		City, State, Zip: Onalaska, WI 54650	
E-Mail Address:			
Summary of Conversation			
<p>Mr. Paudler has been aware of the site since the initiation of the site investigation. He believes that de-listing the site would save a considerable amount of money. He felt that there has been minimal effect on the surrounding community from the landfill site, and that the community has been kept "pretty well informed". He is pleased to see the apparent success of the cleanup effort.</p>			

Attachment 4

Major Documents Reviewed

References, Major Documents Reviewed

CH2M HILL. *Quality Assurance Project Plan, Onalaska Municipal Landfill Site*. 2002.

U.S. Department of Health and Human Services. *Public Health Assessment for: Interim, Onalaska Municipal Landfill*. July 1992.

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U.S. EPA. *Remedial Investigation Report, Onalaska Municipal Landfill Site*. December 1989.

WDNR. *Guidance on Natural Attenuation for Petroleum Releases, Pub-RR-614*. March 2003.

WDNR. *Understanding Chlorinated Hydrocarbon Behavior in Groundwater: (Draft) Pub-RR-69*. December 2002.

Wisconsin Division of Health. *Preliminary Health Assessment, Onalaska Municipal Landfill*. December 1988.

Attachment 5

Monitoring Data

Table 1
AW-1
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/23/03	PAL	ES
1,2,4-Trimethylbenzene	25	8.4	96	480
1,3,5-Trimethylbenzene	22	6.1	96	480
Acetone	6	< 1.1	200	1000
Methylene chloride	3.8	< 0.29	0.5	5
Xylenes (total)	4	4.7	1,000	10,000

Metals, mg/L

Arsenic	< 0.0021	< 0.0021	0.005	0.05
Barium	0.25	0.13	0.4	2
Cadmium	0.0032	< 0.00028	0.0005	0.005
Cobalt	0.0043	< 0.00074	0.008	0.04
Iron	4.5	0.39	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	6	0.7	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 3	---	---
Ethene	< 2.9	< 2.9	---	---
Methane	1500	690	---	---

Natural Attenuation

Parameters, mg/L

Chloride	2.1	5.6	125	250
Nitrate as N	< 0.0076	0.83	2	10
Sulfate	9.1	6.2	125	250
Total Alkalinity	290	210	---	---
Total Organic Carbon	6	2	---	---

Note: Please see notes provided at the end of this table.

Table 1
AW-9
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/23/03	PAL	ES
1,2,4-Trimethylbenzene	1.6	< 0.37	96	480
Acetone	2.9	< 1.1	200	1000
Methylene chloride	3.8	0.34		5

Metals, mg/L

Arsenic	< 0.0021	< 0.0021	0.005	0.05
Barium	0.072	0.051	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	0.008	0.04
Iron	0.067	< 0.042	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	0.041	0.016	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	< 0.6	---	---
Ethene	< 0.29	< 0.58	---	---
Methane	260	220	---	---

Natural Attenuation

Parameters, mg/L

Chloride	3.1	3	125	250
Nitrate as N	0.42	1.1	2	10
Sulfate	3.5	3.1	125	250
Total Alkalinity	220	170	---	---
Total Organic Carbon	1	0.8	---	---

Note: Please see notes provided at the end of this table.

Table 1
AW-13
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/02	Duplicate 12/12/2002	4/22/03	PAL	ES
1,2,4-Trimethylbenzene	2	1.8	860	96	480
1,3,5-Trimethylbenzene	< 0.4	1.1	32	96	480
Acetone	2.5	5.9	< 24	200	1000
Methylene chloride	3.6	3.6	< 6.4	0.5	5
Xylenes (total)	< 0.44	< 0.44	10	1,000	10,000

Metals, mg/L					
Arsenic	0.0033	< 0.0021	0.0048	0.005	0.05
Barium	0.28	0.27	0.2	0.4	2
Cadmium	< 0.00028	< 0.00028	0.00034	0.0005	0.005
Cobalt	0.0043	0.0044	< 0.00074	0.008	0.04
Iron	4.7	5.1	34.8	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	0.0015	0.015
Manganese	24.3	23.7	11.4	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L					
Ethane	< 1.5	< 0.6	< 3	---	---
Ethene	< 1.4	< 0.58	< 2.9	---	---
Methane	300	340	2200	---	---

Natural Attenuation Parameters, mg/L					
Chloride	2.6	2.3	6.7	125	250
Nitrate as N	0.2	0.28	0.01	2	10
Sulfate	3.1	2.7	0.49	125	250
Total Alkalinity	550	550	260	---	---
Total Organic Carbon	5	4	5	---	---

Note: Please see notes provided at the end of this table.

Table 1
AW-20
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/02	4/22/03	Duplicate 4/23/03	PAL	ES
1,2,4-Trimethylbenzene	22	450	450	96	480
1,3,5-Trimethylbenzene	17	200	190	96	480
Acetone	3.6	< 17	< 17	200	1000
Methylene chloride	3.4	< 4.5	< 4.5	0.5	5
Naphthalene	0.64	8.2	8.9	8	40
Xylenes (total)	1.1	30	28	1,000	10,000

Metals, mg/L

Arsenic	0.0088	< 0.0021	< 0.0021	0.005	0.05
Barium	0.29	0.13	0.23	0.4	2
Cadmium	0.00037	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	0.011	< 0.00074	0.01	0.008	0.04
Iron	23.3	0.39	5.4	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	0.0015	0.015
Manganese	17	0.7	11.8	0.025	0.05
Mercury	0.000087	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 3	< 3	---	---
Ethene	< 2.9	< 2.9	< 2.9	---	---
Methane	1600	690	830	---	---

Natural Attenuation

Parameters, mg/L

Chloride	1.8	5.6	7.1	125	250
Nitrate as N	< 0.0076	0.83	1.9	2	10
Sulfate	1.1	6.2	3.9	125	250
Total Alkalinity	600	210	400	---	---
Total Organic Carbon	15	2	10	---	---

Note: Please see notes provided at the end of this table.

Table 1
AW-25
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/22/03	PAL	ES
1,2,4-Trimethylbenzene	240	52	96	480
1,3,5-Trimethylbenzene	38	9.1	96	480
Methylene chloride	5.1	< 0.72	0.5	5
Naphthalene	4.5	< 1	8	40
Xylenes (total)	5.6	2.9	1,000	10,000

Metals, mg/L

Arsenic	0.0034	< 0.0021	0.005	0.05
Barium	0.43	0.23	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	0.0049	0.0021	0.008	0.04
Iron	13.8	3.6	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	6.6	2.3	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 3	---	---
Ethene	< 2.9	< 2.9	---	---
Methane	570	1400	---	---

Natural Attenuation

Parameters, mg/L

Chloride		15.2	125	250
Nitrate as N	0.97	2.2	2	10
Sulfate	4.4	1.9	125	250
Total Alkalinity	520	320	---	---
Total Organic Carbon	7	6	---	---

Note: Please see notes provided at the end of this table.

Table 1
AW-28
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/22/03	PAL	ES
1,2,4-Trimethylbenzene	45	44	96	480
1,3,5-Trimethylbenzene	21	18	96	480
Acetone	5.4	< 2.2	200	1000
Methylene chloride	4.6	< 0.58	0.5	5
Toluene	0.83	< 0.78	200	1,000
Xylenes (total)	2.9	1.6	1,000	10,000

Metals, mg/L

Arsenic	0.0026	< 0.0021	0.005	0.05
Barium	0.26	0.22	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	0.0064	0.0036	0.008	0.04
Iron	9.8	3.7	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	5	2.4	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 3	---	---
Ethene	< 2.9	< 2.9	---	---
Methane	1200	1700	---	---

Natural Attenuation

Parameters, mg/L

Chloride	10.8	14	125	250
Nitrate as N	1.1	1.7	2	10
Sulfate	1.4	2.7	125	250
Total Alkalinity	370	360	---	---
Total Organic Carbon	9	11	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-1S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	4/22/03	PAL	ES
2-Butanone	< 0.59	0.82	---	---
Acetone	3.7	< 1.1	200	1000
Methylene chloride	2.4	0.37	0.5	5

Metals, mg/L

Arsenic	0.0029	< 0.0021	0.005	0.05
Barium	0.034	0.039	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	0.008	0.04
Iron	0.15	0.12	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	0.86	0.76	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	0.00088	0.0012	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	< 0.3	---	---
Ethene	< 0.29	< 0.29	---	---
Methane	18	150	---	---

Natural Attenuation

Parameters, mg/L

Chloride	5.5	7.3	125	250
Nitrate as N	< 0.0076	0.14	2	10
Sulfate	19.7	12.9	125	250
Total Alkalinity	120	140	---	---
Total Organic Carbon	4	3	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-1M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	4/22/03	PAL	ES
Acetone	3.4	< 1.1	200	1000
Methylene chloride	2.4	0.32	0.5	5

Metals, mg/L

Arsenic	0.014	0.01	0.005	0.05
Barium	0.32	0.33	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	0.008	0.04
Iron	8.7	7.7	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	1.7	1.6	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	< 0.3	---	---
Ethene	< 0.29	< 0.29	---	---
Methane	9.9	89	---	---

Natural Attenuation

Parameters, mg/L

Chloride	7.8	8.1	125	250
Nitrate as N	< 0.0076	< 0.0076	2	10
Sulfate	5.2	5.7	125	250
Total Alkalinity	76	72	---	---
Total Organic Carbon	4	3	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-2S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	4/22/03	PAL	ES
Acetone	3.8	< 1.1	200	1000
Benzene	0.91	0.45	0.5	5
Chlorobenzene	19	1.5	---	---
Methylene chloride	2.8	< 0.29	0.5	5

Metals, mg/L

Arsenic	0.012	0.012	0.005	0.05
Barium	0.17	0.14	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	0.008	0.0013	0.008	0.04
Iron	29.5	29.3	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	1.9	2.8	0.025	0.05
Mercury	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	0.00084	0.002	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 1.5	< 1.5	---	---
Ethene	< 1.4	< 1.4	---	---
Methane	520	540	---	---

Natural Attenuation

Parameters, mg/L

Chloride	26.1	18.4	125	250
Nitrate as N	< 0.0076	0.01	2	10
Sulfate	< 0.11	0.22	125	250
Total Alkalinity	180	170	---	---
Total Organic Carbon	6	4	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-2M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	4/22/03	PAL	ES
Acetone	5.5	< 1.1	200	1000
Methylene chloride	3.1	< 0.29	0.5	5

Metals, mg/L

Arsenic	0.019	0.019	0.005	0.05
Barium	0.37	0.66	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	0.008	0.04
Iron	5	9.6	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	0.41	0.64	0.025	0.05
Mercury	0.000092	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	< 0.6	---	---
Ethene	< 0.29	< 0.58	---	---
Methane	22	310	---	---

Natural Attenuation

Parameters, mg/L

Chloride	4.8	16	125	250
Nitrate as N	< 0.0076	< 0.0076	2	10
Sulfate	0.13	< 0.11	125	250
Total Alkalinity	100	160	---	---
Total Organic Carbon	4	4	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-4S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/02	Duplicate 12/12/2002	4/22/03	PAL	ES
1,2,4-Trimethylbenzene	540	570	780	96	480
1,3,5-Trimethylbenzene	120	130	170	96	480
Ethylbenzene	10	< 10	16	140	700
Naphthalene	< 10	< 10	14	8	40
Xylenes (total)	29	27	54	1,000	10,000

Metals, mg/L

Arsenic	0.0089	0.009	0.0065	0.005	0.05
Barium	0.3	0.32	0.26	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.00074	0.008	0.04
Iron	16.9	17.2	15.4	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	0.0015	0.015
Manganese	2.1	2.1	1.8	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 3	< 3	---	---
Ethene	< 2.9	< 2.9	< 2.9	---	---
Methane	1200	750	1700	---	---

**Natural Attenuation
Parameters, mg/L**

Chloride	13.5	13.5	10.2	125	250
Nitrate as N	< 0.0076	< 0.0076	< 0.0076	2	10
Sulfate	0.98	0.92	0.22	125	250
Total Alkalinity	280	280	260	---	---
Total Organic Carbon	5	6	5	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-5S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/22/03	PAL	ES
1,2,4-Trimethylbenzene	210	180	96	480
1,3,5-Trimethylbenzene	47	38	96	480
Ethylbenzene	6.2	5.1	140	700
Methylene chloride	3.9	< 1.7	0.5	5
Naphthalene	6.2	5.4	8	40
Xylenes (total)	12	13	1,000	10,000

Metals, mg/L

Arsenic	0.0098	0.011	0.005	0.05
Barium	0.18	0.28	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	0.0025	0.0041	0.008	0.04
Iron	10.2	19.4	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	1.6	2	0.025	0.05
Mercury	0.000088	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 0.3	---	---
Ethene	< 2.9	< 0.29	---	---
Methane	130	230	---	---

Natural Attenuation

Parameters, mg/L

Chloride	5.8	5.7	125	250
Nitrate as N	0.1	0.62	2	10
Sulfate	0.34	3.3	125	250
Total Alkalinity	140	160	---	---
Total Organic Carbon	5	4	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-6S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	PAL	ES
1,1-Dichloroethane	0.55	85	850
Acetone	2.6	200	1000
Methylene chloride	2.2	0.5	5

Metals, mg/L

Arsenic	< 0.0021	0.005	0.05
Barium	0.17	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	0.0022	0.008	0.04
Iron	0.065	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	2.7	0.025	0.05
Mercury	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	2.9	---	---

Natural Attenuation

Parameters, mg/L

Chloride	6.7	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	4	125	250
Total Alkalinity	160	---	---
Total Organic Carbon	6	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-6M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	PAL	ES
Acetone	2.1	200	1000
Methylene chloride	2.1	0.5	5

Metals, mg/L

Arsenic	0.0024	0.005	0.05
Barium	0.75	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	< 0.042	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	1.7	0.025	0.05
Mercury	0.000097	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	1.1	---	---

Natural Attenuation

Parameters, mg/L

Chloride	6	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	0.42	125	250
Total Alkalinity	100	---	---
Total Organic Carbon	4	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-8S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/02	PAL	ES
Acetone	2.2	200	1000
Methylene chloride	2.6	0.5	5

Metals, mg/L			
Arsenic	< 0.0021	0.005	0.05
Barium	0.088	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	0.052	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	0.59	0.025	0.05
Mercury	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L			
Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	0.58	---	---

Natural Attenuation Parameters, mg/L			
Chloride	9.5	125	250
Nitrate as N	1.5	2	10
Sulfate	12.3	125	250
Total Alkalinity	190	---	---
Total Organic Carbon	0.9	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-8M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	PAL	ES
Acetone	2.9	200	1000
Methylene chloride	3.2	0.5	5

Metals, mg/L

Arsenic	< 0.0021	0.005	0.05
Barium	0.68	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	< 0.042	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	2.7	0.025	0.05
Mercury	0.00009	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	2	---	---

Natural Attenuation

Parameters, mg/L

Chloride	2.6	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	5.7	125	250
Total Alkalinity	220	---	---
Total Organic Carbon	2	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-12S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	PAL	ES
Acetone	3	200	1000
Methylene chloride	2.7	0.5	5

Metals, mg/L

Arsenic	< 0.0021	0.005	0.05
Barium	0.021	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	< 0.042	0.15	0.3
Lead	0.0034	0.0015	0.015
Manganese	0.0023	0.025	0.05
Mercury	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	< 0.39	---	---

Natural Attenuation

Parameters, mg/L

Chloride	24.3	125	250
Nitrate as N	1.6	2	10
Sulfate	7.2	125	250
Total Alkalinity	170	---	---
Total Organic Carbon	1	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-14S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	4/23/03	PAL	ES
1,2,4-Trimethylbenzene	1.7	0.97	96	480
1,3,5-Trimethylbenzene	0.64	< 0.4	96	480
Acetone	4.3	< 1.1	200	1000
Methylene chloride	2.1	< 0.29	0.5	5
Naphthalene	5	2.2	8	40
Xylenes (total)	1.4	0.47	1,000	10,000

Metals, mg/L

Arsenic	< 0.0021	< 0.0021	0.005	0.05
Barium	0.18	0.084	0.4	2
Cadmium	0.00045	< 0.00028	0.0005	0.005
Cobalt	0.0052	0.0015	0.008	0.04
Iron	11.6	2.5	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	3.7	0.83	0.025	0.05
Mercury	0.000088	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 3	< 0.6	---	---
Ethene	< 2.9	< 0.58	---	---
Methane	450	430	---	---

Natural Attenuation

Parameters, mg/L

Chloride	5	5.4	125	250
Nitrate as N	0.01	0.34	2	10
Sulfate	3	5.4	125	250
Total Alkalinity	210	150	---	---
Total Organic Carbon	14	5	---	---

Note: Please see notes provided at the end of this table.

Table 1
MW-15M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	PAL	ES
1,1-Dichloroethane	1	85	850
cis-1,2-Dichloroethene	0.56	7	70
Methylene chloride	3	0.5	5

Metals, mg/L

Arsenic	0.0054	0.005	0.05
Barium	0.86	0.4	2
Cadmium	0.00031	0.0005	0.005
Cobalt	0.0012	0.008	0.04
Iron	1.1	0.15	0.3
Lead	0.0049	0.0015	0.015
Manganese	3.6	0.025	0.05
Mercury	0.000092	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	12	---	---

**Natural Attenuation
Parameters, mg/L**

Chloride	5.2	125	250
Nitrate as N	0.03	2	10
Sulfate	2.4	125	250
Total Alkalinity	240	---	---
Total Organic Carbon	3	---	---

Note: Please see notes provided at the end of this table.

Table 1
PZ-1
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/02	4/23/03	Duplicate 4/23/03	PAL	ES
Methylene chloride	3.4	< 0.29	< 0.29	0.5	5

Metals, mg/L

Arsenic	0.0029	< 0.0021	< 0.0021	0.005	0.05
Barium	0.024	0.031	0.031	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.00074	0.008	0.04
Iron	< 0.042	< 0.042	< 0.042	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	0.0015	0.015
Manganese	0.19	0.3	0.29	0.025	0.05
Mercury	0.000091	< 0.000087	< 0.000087	0.0002	0.002
Vanadium	0.0013	0.0011	0.0012	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	< 0.3	< 0.3	---	---
Ethene	< 0.29	< 0.29	< 0.29	---	---
Methane	6.6	1.5	1.9	---	---

**Natural Attenuation
Parameters, mg/L**

Chloride	9.4	12.8	13	125	250
Nitrate as N	0.23	0.23	0.23	2	10
Sulfate	1.6	5.5	5.4	125	250
Total Alkalinity	120	130	140	---	---
Total Organic Carbon	3	< 0.7	2	---	---

Note: Please see notes provided at the end of this table.

Table 1
PZ-2
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	PAL	ES
Acetone	2.6	200	1000
Methylene chloride	2.4	0.5	5

Metals, mg/L

Arsenic	0.056	0.005	0.05
Barium	0.66	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	0.011	0.008	0.04
Iron	98.8	0.15	0.3
Lead	0.0062	0.0015	0.015
Manganese	5.2	0.025	0.05
Mercury	0.00013	0.0002	0.002
Vanadium	0.026	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.6	---	---
Ethene	< 0.58	---	---
Methane	98	---	---

Natural Attenuation

Parameters, mg/L

Chloride	8.6	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	2.4	125	250
Total Alkalinity	160	---	---
Total Organic Carbon	15	---	---

Note: Please see notes provided at the end of this table.

Table 1
PZ-3
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/11/02	PAL	ES
Acetone	3.1	200	1000
Methylene chloride	2.5	0.5	5

Metals, mg/L

Arsenic	0.0038	0.005	0.05
Barium	0.097	0.4	2
Cadmium	0.00099	0.0005	0.005
Cobalt	0.0018	0.008	0.04
Iron	1.2	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	2.7	0.025	0.05
Mercury	0.00012	0.0002	0.002
Vanadium	0.0028	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	2.4	---	---

Natural Attenuation

Parameters, mg/L

Chloride	6.3	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	1.2	125	250
Total Alkalinity	160	---	---
Total Organic Carbon		---	---

Note: Please see notes provided at the end of this table.

Table 1
PZ-4
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	PAL	ES
Acetone	3.5	200	1000
Methylene chloride	2.6	0.5	5

Metals, mg/L

Arsenic	< 0.0021	0.005	0.05
Barium	0.12	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	0.001	0.008	0.04
Iron	< 0.042	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	2.6	0.025	0.05
Mercury	0.000088	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Dissolved Gases, ug/L

Ethane	< 0.3	---	---
Ethene	< 0.29	---	---
Methane	< 0.39	---	---

Natural Attenuation

Parameters, mg/L

Chloride	5.5	125	250
Nitrate as N	< 0.0076	2	10
Sulfate	4.2	125	250
Total Alkalinity	130	---	---
Total Organic Carbon	5	---	---

Note: Please see notes provided at the end of this table.

Table 1
PZ-5
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L				
	12/12/02	4/23/03	PAL	ES
Acetone	3	< 1.1	200	1000
Methylene chloride	2.5	0.34	0.5	5

Metals, mg/L				
Arsenic	< 0.0021	< 0.0021	0.005	0.05
Barium	0.091	0.075	0.4	2
Cadmium	< 0.00028	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	0.008	0.04
Iron	0.13	0.12	0.15	0.3
Lead	< 0.0016	< 0.0016	0.0015	0.015
Manganese	0.18	0.17	0.025	0.05
Mercury	0.000098	< 0.000087	0.0002	0.002
Vanadium	0.0011	0.00075	0.006	0.03

Dissolved Gases, ug/L				
Ethane	< 0.6	< 0.3	---	---
Ethene	< 0.58	< 0.29	---	---
Methane	130	210	---	---

Natural Attenuation Parameters, mg/L				
Chloride	9.7	8.6	125	250
Nitrate as N	0.48	0.37	2	10
Sulfate	5.7	10.1	125	250
Total Alkalinity	260	220	---	---
Total Organic Carbon	2	1	---	---

Note: Please see notes provided at the end of this table.

Table 1
Ackerman
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	4/22/03	PAL	ES
(No VOCs Detected)			
Metals, mg/L			
Arsenic	< 0.0021	0.005	0.05
Barium	0.024	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	5.9	0.15	0.3
Lead	0.0034	0.0015	0.015
Manganese	0.12	0.025	0.05
Mercury	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 1
Hubley
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L

4/22/03

PAL

ES

(No VOCs Detected)

Metals, mg/L

Arsenic	< 0.0021	0.005	0.05
Barium	0.084	0.4	2
Cadmium	< 0.00028	0.0005	0.005
Cobalt	< 0.00074	0.008	0.04
Iron	0.16	0.15	0.3
Lead	< 0.0016	0.0015	0.015
Manganese	0.2	0.025	0.05
Mercury	< 0.000087	0.0002	0.002
Vanadium	< 0.00067	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 1
TRIP BLANK
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic

Compounds (VOC), ug/L	12/12/02	12/12/02	4/22/03	PAL	ES
2-Butanone	< 0.59	< 0.59	2.2	---	---
Acetone	< 1.1	< 1.1	3.5	200	1000
Methylene chloride	1.9	2	1	0.5	5

Metals, mg/L

Arsenic				0.005	0.05
Barium				0.4	2
Cadmium				0.0005	0.005
Cobalt				0.008	0.04
Iron				0.15	0.3
Lead				0.0015	0.015
Manganese				0.025	0.05
Mercury				0.0002	0.002
Vanadium				0.006	0.03

Dissolved Gases, ug/L

Ethane				---	---
Ethene				---	---
Methane				---	---

**Natural Attenuation
Parameters, mg/L**

Chloride				125	250
Nitrate as N				2	10
Sulfate				125	250
Total Alkalinity				---	---
Total Organic Carbon				---	---

Note: Please see notes provided at the end of this table.

Table 1
Notes
Summary of Detected Compounds
Former Onalaska Landfill

For the VOC only; the compounds reported are the only VOC that have been detected since the December 2002 sampling event

Shaded cells indicate the compound exceeds the WDNR Preventive Action Level (PAL)

Shaded cell and bold number indicates the compound exceeds the WDNR PAL and Enforcement Standard (ES)

The ES and PAL criteria for trimethylbenzene (TMB) is the sum of 1,2,4-TMB and 1,3,5-TMB

< indicates the compound was not detected at or above the detection limit

--- indicates no criteria associated with that compound

Ackerman and Hubley residential wells were sampled for VOC and metals

Attachment 6

Site Inspection Record

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Onalaska Municipal Landfill	Date of inspection: 04/22/2003
Location and Region: Onalaska, WI Region V	EPA ID: WID980821656
Agency, office, or company leading the five-year review: WDNR	Weather/temperature: Sunny, 55°F
Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input checked="" type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment Other _____ </div> <div style="width: 45%;"> <input checked="" type="checkbox"/> Landfill cover/containment Groundwater containment Vertical barrier walls </div> </div>	
Attachments: Site map attached as Attachment 2	
II. INTERVIEWS (Check all that apply)	
<div style="display: flex; justify-content: space-between;"> <div>1. O&M site manager <u>Dave Carper</u></div> <div><u>Remedial Project Manager</u></div> <div><u>04/22/2003</u></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>Name</div> <div>Title</div> <div>Date</div> </div> <p>Interviewed <input checked="" type="checkbox"/> at site at office by phone Phone no. _____</p> <p>Problems, suggestions; Report attached _____</p> 	
<div style="display: flex; justify-content: space-between;"> <div>2. O&M staff <u>Peter Moore</u></div> <div><u>Hydrogeologist</u></div> <div><u>04/22/2003</u></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>Name</div> <div>Title</div> <div>Date</div> </div> <p>Interviewed <input checked="" type="checkbox"/> at site at office by phone Phone no. _____</p> <p>Problems, suggestions; Report attached _____</p> 	

2. **Local regulatory authorities and response agencies** (e.g., State and Tribal offices, emergency response office, police department, office of public health, environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; Report attached			

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; Report attached			

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; Report attached			

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; Report attached			

Surface water collection and treatment

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents			
	O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Remarks _____			
2.	Site-Specific Health and Safety Plan	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Contingency plan/emergency response plan	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Remarks _____			
3.	O&M and OSHA Training Records	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Remarks _____			
4.	Permits and Service Agreements			
	Air discharge permit	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Effluent discharge	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Other permits _____	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
5.	Gas Generation Records	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
6.	Settlement Monument Records	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
7.	Groundwater Monitoring Records	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Remarks _____			
8.	Leachate Extraction Records	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
9.	Discharge Compliance Records			
	Air	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
	Remarks _____			
10.	Daily Access/Security Logs	Readily available	Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			

IV. O&M COSTS

1. **O&M Organization**

State in-house

☒ Contractor for State

PRP in-house

Contractor for PRP

Federal Facility in-house

Contractor for Federal Facility

Other _____

2. **O&M Cost Records**

☒ Readily available

☒ Up to date

Funding mechanism/agreement in place

Original O&M cost estimate _____ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ Breakdown attached

Date

Date

Total cost

From _____ To _____ Breakdown attached

Date

Date

Total cost

From _____ To _____ Breakdown attached

Date

Date

Total cost

From _____ To _____ Breakdown attached

Date

Date

Total cost

From _____ To _____ Breakdown attached

Date

Date

Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable N/A

A. Fencing No issues

1. **Fencing damaged**

Location shown on site map

☒ Gates secured

N/A

Remarks _____

B. Other Access Restrictions No issues

1. **Signs and other security measures**

Location shown on site map

N/A

Remarks _____

C. Institutional Controls (ICs)**1. Implementation and enforcement**

Site conditions imply ICs not properly implemented

Yes ☒ No N/A

Site conditions imply ICs not being fully enforced

Yes ☒ No N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: variableResponsible party/agency: WDNRContact: Dave Carper Remedial Project Manager 04/22/2003 (608)785-9973

Name

Title

Date

Phone no.

Reporting is up-to-date

☒ Yes No N/A

Reports are verified by the lead agency

☒ Yes No N/ASpecific requirements in deed or decision documents have been met ☒ Yes No N/A

Violations have been reported

Yes No ☒ N/A

Other problems or suggestions: Report attached

2. Adequacy☒ ICs are adequate

ICs are inadequate

N/A

Remarks _____

D. General**1. Vandalism/trespassing**

Location shown on site map

☒ No vandalism evident

Remarks _____

2. Land use changes on site☒ N/A

Remarks _____

3. Land use changes off site☒ N/A

Remarks _____

VI. GENERAL SITE CONDITIONS**A. Roads**☒ Applicable N/A**1. Roads damaged**

Location shown on site map

☒ Roads adequate

N/A

Remarks _____

B. Other Site Conditions			
Remarks _____ _____ _____ _____ _____			
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable N/A			
A. Landfill Surface			
1.	Settlement (Low spots) Areal extent _____ Depth _____ Remarks _____	Location shown on site map <input checked="" type="checkbox"/> Settlement not evident	
2.	Cracks Lengths _____ Widths _____ Depths _____ Remarks _____	Location shown on site map <input checked="" type="checkbox"/> Cracking not evident	
3.	Erosion Areal extent _____ Depth _____ Remarks _____	Location shown on site map <input checked="" type="checkbox"/> Erosion not evident	
4.	Holes Areal extent _____ Depth _____ Remarks _____	Location shown on site map <input checked="" type="checkbox"/> Holes not evident	
5.	Vegetative Cover Grass Cover properly established Trees/Shrubs (indicate size and locations on a diagram) Remarks _____		<input checked="" type="checkbox"/> No signs of stress
6.	Alternative Cover (armored rock, concrete, etc.) Remarks _____		<input checked="" type="checkbox"/> N/A
7.	Bulges Areal extent _____ Height _____ Remarks _____	Location shown on site map <input checked="" type="checkbox"/> Bulges not evident	

8	Wet Areas/Water Damage		<input type="checkbox"/> Wet areas/water damage not evident
	Wet areas	Location shown on site map	Areal extent _____
	Ponding	Location shown on site map	Areal extent _____
	Seeps	Location shown on site map	Areal extent _____
	Soft subgrade	Location shown on site map	Areal extent _____
	Remarks _____		
9.	Slope Instability	Slides	Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability
	Areal extent _____		
	Remarks _____		
B. Benches Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench	Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____		
2.	Bench Breached	Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____		
3.	Bench Overtopped	Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____		
C. Letdown Channels Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement	Location shown on site map	<input checked="" type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____		
2.	Material Degradation	Location shown on site map	<input checked="" type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____		
3.	Erosion	Location shown on site map	<input checked="" type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		

4.	Undercutting Areal extent _____ Depth _____ Remarks _____	Location shown on site map <input type="checkbox"/> No evidence of undercutting	
5.	Obstructions Type _____ Location shown on site map _____ Areal extent _____ Size _____ Remarks _____	<input checked="" type="checkbox"/> No obstructions	
6.	Excessive Vegetative Growth Type <u>none</u> No evidence of excessive growth Vegetation in channels does not obstruct flow Location shown on site map _____ Areal extent _____ Remarks _____		
D. Cover Penetrations <input checked="" type="checkbox"/> Applicable N/A			
1.	Gas Vents Active <input checked="" type="checkbox"/> Passive Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition Evidence of leakage at penetration Needs Maintenance N/A Remarks _____		
2.	Gas Monitoring Probes Properly secured/locked Functioning Routinely sampled Good condition Evidence of leakage at penetration Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____		
3.	Monitoring Wells (within surface area of landfill) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition Evidence of leakage at penetration Needs Maintenance N/A Remarks _____		
4.	Leachate Extraction Wells Properly secured/locked Functioning Routinely sampled Good condition Evidence of leakage at penetration Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____		
5.	Settlement Monuments Located Routinely surveyed <input checked="" type="checkbox"/> N/A Remarks _____		

E. Gas Collection and Treatment		Applicable	<input type="checkbox"/> N/A
1.	Gas Treatment Facilities Flaring Thermal destruction Collection for reuse Good condition Needs Maintenance Remarks _____ _____		
2.	Gas Collection Wells, Manifolds and Piping Good condition Needs Maintenance Remarks _____ _____		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) Good condition Needs Maintenance N/A Remarks _____ _____		
F. Cover Drainage Layer		Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected Functioning N/A Remarks _____ _____		
2.	Outlet Rock Inspected Functioning N/A Remarks _____ _____		
G. Detention/Sedimentation Ponds		Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation Areal extent _____ Depth _____ <input checked="" type="checkbox"/> N/A Siltation not evident Remarks _____ _____		
2.	Erosion Areal extent _____ Depth _____ Erosion not evident Remarks _____ _____		
3.	Outlet Works Functioning N/A Remarks _____ _____		
4.	Dam Functioning N/A Remarks _____ _____		

H. Retaining Walls		Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations	Location shown on site map	Deformation not evident
	Horizontal displacement _____	Vertical displacement _____	
	Rotational displacement _____		
	Remarks _____		
2.	Degradation	Location shown on site map	Degradation not evident
	Remarks _____		
I. Perimeter Ditches/Off-Site Discharge		<input checked="" type="checkbox"/> Applicable	N/A
1.	Siltation	Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	Vegetative Growth	Location shown on site map	N/A
	<input checked="" type="checkbox"/> Vegetation does not impede flow		
	Areal extent _____	Type _____	
	Remarks _____		
3.	Erosion	Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
	Areal extent _____	Depth _____	
	Remarks _____		
4.	Discharge Structure	<input checked="" type="checkbox"/> Functioning	N/A
	Remarks _____	When system is operating	
VIII. VERTICAL BARRIER WALLS		Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	Location shown on site map	Settlement not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	Performance Monitoring	Type of monitoring _____	
	Performance not monitored		
	Frequency _____	Evidence of breaching	
	Head differential _____		
	Remarks _____		

C. Treatment System			
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Treatment Train (Check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Metals removal Oil/water separation Bioremediation </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Air stripping Carbon adsorbers </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Filters </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Additive (e.g., chelation agent, flocculent) </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Others </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Good condition Needs Maintenance </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Sampling ports properly marked and functional YES </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Sampling/maintenance log displayed and up to date YES </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Equipment properly identified YES </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Quantity of groundwater treated annually System currently on standby during Natural Attenuation Evaluation </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Quantity of surface water treated annually N/A </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
2.	Electrical Enclosures and Panels (properly rated and functional) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> N/A <input checked="" type="checkbox"/> Good condition Needs Maintenance </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
3.	Tanks, Vaults, Storage Vessels <div style="display: flex; justify-content: space-between; margin-top: 5px;"> N/A <input checked="" type="checkbox"/> Good condition Proper secondary containment Needs Maintenance </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
4.	Discharge Structure and Appurtenances <div style="display: flex; justify-content: space-between; margin-top: 5px;"> N/A <input checked="" type="checkbox"/> Good condition Needs Maintenance </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
5.	Treatment Building(s) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) Needs repair </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Chemicals and equipment properly stored </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
6.	Monitoring Wells (pump and treatment remedy) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Properly secured/locked Functioning Routinely sampled <input checked="" type="checkbox"/> Good condition </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> All required wells located Needs Maintenance N/A </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Remarks </div>		
D. Monitoring Data			
1.	Monitoring Data <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality </div>		
2.	Monitoring data suggests: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining </div>		

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

All required wells located

Needs Maintenance

N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Currently, the Site is being monitored for Natural Attenuation as a modification to the remedy (i.e. groundwater extraction). Monitoring for Natural Attenuation was implemented in the fall of 2001. Preliminary results from Natural Attenuation monitoring demonstrates that Natural Attenuation may be an effective modification to the remedy for this site, and would be protective of human health and the environment. Future monitoring and evaluation will be conducted for determining if Natural Attenuation should be implemented as a modification to the remedy.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Based upon the Five-Year Review, all immediate threats at the Site have been addressed, and the remedy is expected to be protective of human health and the environment. After the groundwater goals are achieved through pumping and Natural Attenuation in an estimated 30 years or less.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Determine if Natural Attenuation can be an effective modification to the ROD remedy.

Attachment 7

Groundwater ARAR's

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